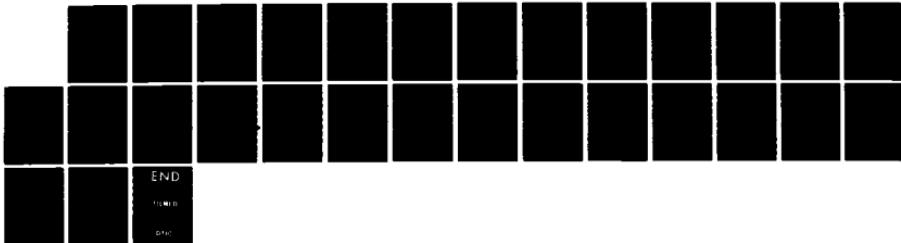


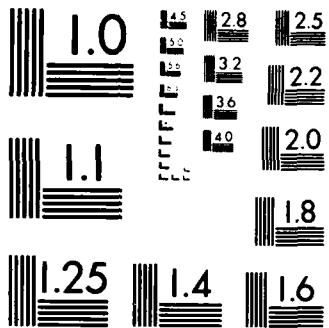
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TITAN-DSI-105800-07-83-5F

AD-A150 261

VOLUME II

SIMULATION OF CRITICAL MATERIALS RESOURCE STRATEGIES

APPENDICES D AND E

FINAL REPORT

CONTRACT EMW-C-0906

ARTICLE III A

Submitted to:

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September 13, 1983

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
1. REPORT NUMBER	2. GOVT ACCESSION NO.	RECIPIENT'S CATALOG NUMBER	
<b>4. TITLE (and Subtitle)</b> <b>Simulation of Critical Materials Resources Strategies</b>		TYPE OF REPORT & PERIOD COVERED	
		Informal Report	
<b>7. AUTHOR(s)</b>  Somerfeld, Dale		<b>5. PERFORMING ORG. REPORT NUMBER</b> <b>TITAN-DSI-105800-83-SF</b>	
		<b>8. CONTRACT OR GRANT NUMBER(s)</b>  <b>EMW-C-0906</b>	
<b>9. PERFORMING ORGANIZATION NAME AND ADDRESS</b> <b>Titan Systems, Inc.</b> <b>P.O. Box 12139</b> <b>La Jolla, California 92037</b>		<b>10. PROGRAM ELEMENT, PROJECT, TASK AREA &amp; WORK UNIT NUMBERS</b>  <b>5261D</b>	
<b>11. CONTROLLING OFFICE NAME AND ADDRESS</b> <b>Natural Resources Division, NP-NR-NR</b> <b>FEMA</b> <b>500 C St., S.W. Washington, D.C. 20472</b>		<b>12. REPORT DATE</b> <b>Sept. 13, 1983</b>	
<b>14. MONITORING AGENCY NAME &amp; ADDRESS (if different from Controlling Office)</b>		<b>13. NUMBER OF PAGES</b> <b>Approx. 200</b>	
		<b>15. SECURITY CLASS. (If this report is unclassified, enter "Unclassified")</b> <b>Unclassified</b>	
		<b>16. DISTRIBUTION STATEMENT (of this Report)</b>  <b>APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED</b>	
<b>17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)</b>			
<b>18. SUPPLEMENTARY NOTES</b>			
<b>19. KEY WORDS (Continue on reverse side if necessary and identify by block number)</b> <b>Critical Material; Strategic Resources</b>			
<b>20. ABSTRACT (Continue on reverse side if necessary and identify by block number)</b> <i>This report addresses preliminary efforts to quantify strategic relationships of materials to force elements. The results of the preliminary materials are emergency but requires further model development.</i>			

## APPENDIX D

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## APPENDIX D

A total of 47 scenarios were prepared and run using the current computer program. The scenarios cover the gamut of region/source importance variations, changes in the amount of commodity supplied under diverse conditions, through consideration of subelement importance to the force element it supports.

## APPENDIX D

### SCENARIO LISTING

1. Baseline - Data Base region importance, commodity sources, commodity amounts and force element designations.
2. Increased Third World region importance.
3. Increased Third World region importance; forces moved to Third World.
4. Baseline region importance; forces moved to Third World.
5. Baseline region importance; Zaire land and air media importance raised.
6. Increased Third World region importance; Zaire land and air media importance raised.
7. Baseline: Zaire land, air and sea media importance raised.
8. Increased Third World region importance; Zaire land, air and sea media importance raised
9. Increased Third World region importance for both levels of conflict 3 and 4; Zaire land and air media importance raised.
10. Baseline; reduce Zambia cobalt by 3500#
11. Baseline; reduce Zambia cobalt by 3500#, increase US cobalt by 3500#
12. Baseline; reduce Zaire cobalt by 3500#.
13. Baseline; reduce Zaire cobalt by 3500#, increase US cobalt by 3500#
14. Baseline; reduce "minor country" and Zambia cobalt by 3500#
15. Baseline; reduce "minor country", Zambia and Zaire cobalt by 7000#, increase US by 3500#
16. Increased Third World region importance; reduce Zambia cobalt by 3500#
17. Increased Third World region importance; reduce Zaire cobalt by 3500#
18. Increased Third World importance; reduce Zaire cobalt by 3500#, increase US by 3500#
19. Baseline; Zaire media importances raised; reduce Zambia cobalt 3500#
20. Baseline; Zaire media importances raised; reduce Zaire cobalt 3500#

21. Baseline; Zaire media importances raised; reduce Zambia cobalt 3500#, increase US cobalt 3500#
22. Baseline: Zaire media importances raised; delete "minor countries"/Zambia cobalt 3500#
23. Increased Third World region importance; Zaire media importances raised; reduce Zambia cobalt 3500#
24. Increased Third World region importance; Zaire media importances raised, reduce Zaire cobalt 3500#
25. Increased Third World region importance; Zaire media importances raised, reduce Zambia cobalt 3500#, increase US cobalt 3500#
26. Increased Third World region importance; Zaire media importance raised, delete "minor country"/Zambia cobalt 3500#
27. Baseline; reduce cobalt stockpile requirement to 50 units
28. Baseline; reduce nickel stockpile requirement to 37 units
29. Baseline; Zaire media importances raised; reduce cobalt stockpile requirement to 50 units
30. Increased Third World region importance; Zaire media importances raised; reduce cobalt stockpile requirement to 50 units
31. Baseline; reduce importance of cobalt to jet aircraft
32. Increased Third World region importance; reduce importance of cobalt to jet aircraft
33. Baseline; reduce importance of nickel to jet aircraft
34. Baseline; Zaire media importances raised; reduce importance of cobalt to jet aircraft
35. Increased Third World region importance; Zaire media importances raised; reduce importance of cobalt to jet aircraft
36. Baseline: reduce importance of pyrethrum to the forces
37. Baseline; reduce importance of cobalt to M-series
38. Increased Third World region importance; reduce importance of cobalt to M-series
39. Baseline; reduce importance of aircraft subelement cobalt users to the force elements.

40. Baseline; forces moved to Third World; reduce Zambia cobalt 3500#
41. Baseline; forces moved to Third World; reduce Zaire cobalt 3500#
42. Increased Third World region importance; forces moved to Third World; reduce Zambia cobalt 3500#
43. Increased Third World region importance; forces moved to Third World; reduce Zaire cobalt 3500#
44. Baseline; Finland media importances reduced
45. Increased Third World region importance; Finland media importances reduced
46. Baseline; Finland deleted
47. Baseline; South Africa deleted.

REMAINDER OF APPENDIX D TO BE SUBMITTED SEPARATELY.

APPENDIX E  
JOINT PURPOSE

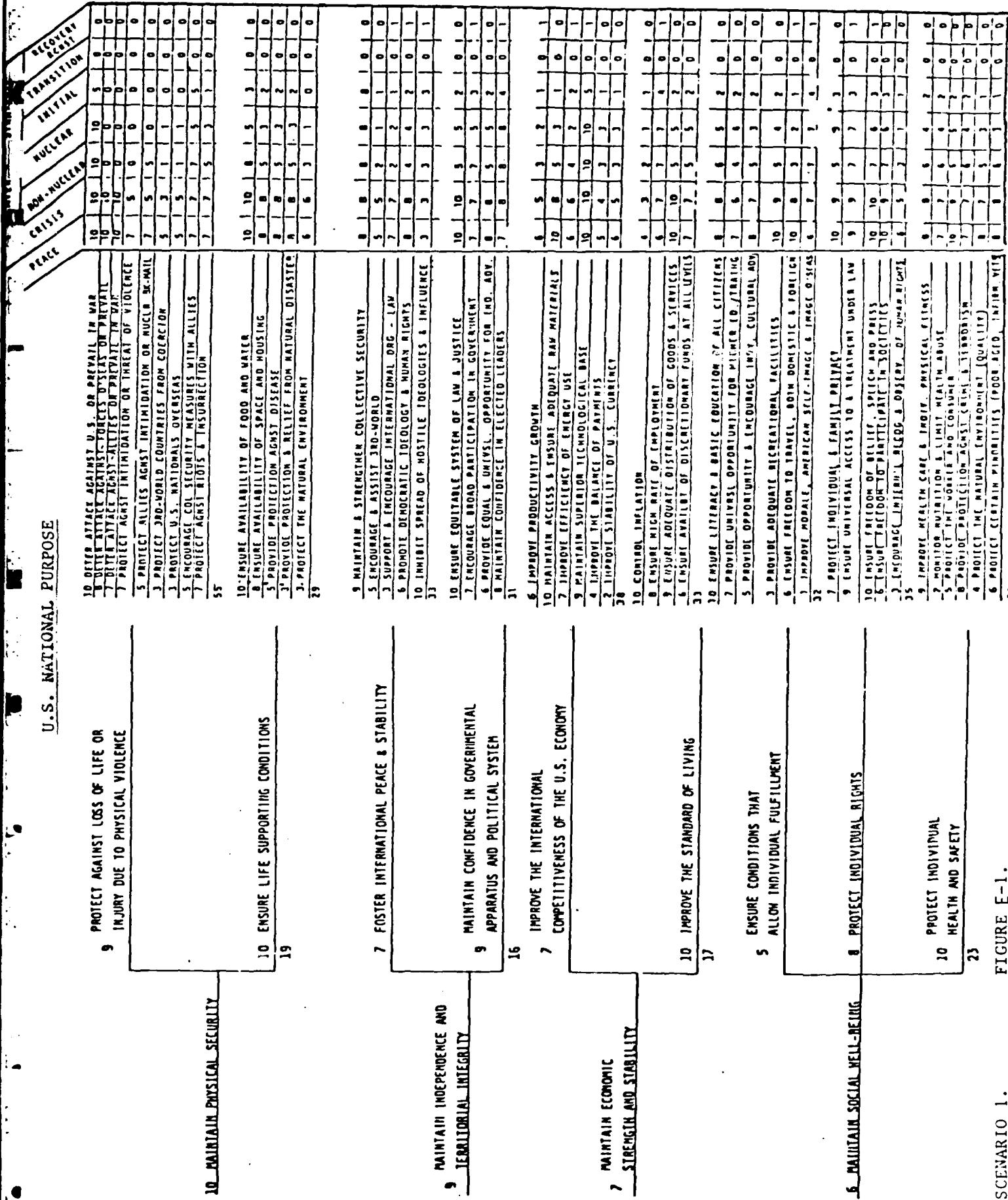
## APPENDIX E

### JOINT PURPOSE

With the completion of the definition of the superpower separate purposes, the examination of the joint state space can be initiated. For purposes of this demonstration, the output (payoff function) has not been incorporated as an integrated segment of the program. Nonetheless, the early analysis efforts graphically portray the fact that moves by one superpower in the realm of strategic and critical materials will affect the second power and that counter-moves must be expressed in terms of commitment of resources.

Within the context of the joint state space, the present degree of achievement of purpose is assessed for each of the players. For this demonstration, all calculations are based on a level of conflict of peace. (Note: In future analyses, this must be expanded to address each level of conflict and the aggregation across all levels of conflict.)

The first scenario (peace) is described in Figure E-1, the U.S. National Purpose, which has been the underlying structure for a number of Decision Science studies. The level of achievement of national purpose is calculated to be 78.19, using standard arithmetic mean calculations. For the Soviets, their peacetime status is as depicted by the check marks (✓) in the Soviet Purpose valued state space (Table 1). The calculated value for the Soviet achievement



**FIGURE E-1.**

## SCENARIO 1.

TABLE E-1  
SOVIET PURPOSE

MAINTAIN LEADERSHIP POSITION OF THE PARTY

- (10) 1.0 MAINTAIN PHYSICAL SECURITY (Protect the Motherland)
  - (10) 1.1.0 MINIMIZE THE DIRECT THREAT
  - (9) 1.2.0 MAINTAIN BUFFER STATE TERRITORIAL INTEGRITY
- (8) 2.0 PROMULGATE THEIR COMMUNIST FORM OF GOVERNMENT
  - (6) 2.1.0 INCREASE THE NUMBER OF SATELLITE STATES
  - (10) 2.2.0 INCREASE THE NUMBER OF SUPPORTING STATES
  - (8) 2.3.0 INCREASE THE NUMBER OF DOMINATED, NON-SATELLITE STATES
  - (5) 2.4.0 INCREASE THE NUMBER OF SYMPATHETIC STATES
- (10) 3.0 PROTECT AGAINST INTERNAL UNREST
  - (10) 3.1.0 CONTROL THROUGH PHYSICAL MEANS
  - (10) 3.2.0 CONTROL THROUGH PSYCHOLOGICAL MEANS
  - (6) 3.3.0 PROVIDE FOR PEOPLE'S REQUIREMENTS
- (9) 4.0 MAINTAIN THE ECONOMIC STRUCTURE
  - (10) 4.1.0 MAINTAIN HIGH LEVEL OF HEAVY INDUSTRY INVESTMENT
  - (6) 4.2.0 ENSURE PRODUCTIVITY
  - (6) 4.3.0 LESSEN DEPENDENCY ON WESTERN GOODS/TECHNOLOGY
  - (7) 4.4.0 MAINTAIN FAVORABLE BALANCE OF PAYMENTS
  - (7) 4.5.0 INCREASE ECONOMIC INFLUENCE

- (10) 1.0 MAINTAIN PHYSICAL SECURITY (Protect the Motherland)
  - (10) 1.1.0 MINIMIZE THE DIRECT THREAT
    - (10) 1.1.1.0 DILUTE US/ALLIES MILITARY CAPABILITY
      - (10) 1.1.1.1 MONITOR/EXPLOIT US/ALLIES TECHNOLOGY - 8
      - (5) 1.1.1.2 FOMENT UNREST IN THESE COUNTRIES - 2
      - (2) 1.1.1.3 SUPPORT TERRORISM IN THESE COUNTRIES - 2
    - (10) 1.1.1.4.0 MAINTAIN ADEQUATE MILITARY POSTURE
      - (5) 1.1.1.4.1.0 MAINTAIN INTERNAL DEFENSE CAPABILITY
      - (8) 1.1.1.4.1.1 MAINTAIN STANDING FORCES SUFFICIENT FOR DEFENSE - 10
      - (5) 1.1.1.4.1.2 MAINTAIN ADEQUATE MILITARY RESEARCH/TECHNOLOGY BASE - 9
      - (10) 1.1.1.4.1.3 PROVIDE ASSURED PRODUCTION BASE
        - 4, 2 10 - Production Assured for Military/Civilian Needs
        - 8 - Production Assured for Military/Essential Civilian
        - 2 5 - Production Assured for Military
        - ✓ - Production Marginal for any Segment
        - 0 - Production Unsuitable for National Plans
      - (8) 1.1.1.4.1.4 ENSURE ADEQUATE LOGISTICS INFRASTRUCTURE
        - 10 - Structure Capable of Raw Material/Finished Product Distribution for Military and Civilian Needs
        - 4, 3 8 - Structure Capable of Raw Material/Finished Product Distribution for Military and Essential Civilian Only
        - 5 - Structure Supports Military Distribution Only
        - ✓ - Structure Considered Marginal
        - 0 - Structure Unsuitied for National Plans
      - (6) 1.1.1.4.1.5 PROVIDE SUITABLE CIVIL DEFENSE STRUCTURE/CAPABILITY - 8

(3) 1.1.1.4.1.6.0 MAINTAIN AN ADEQUATE SUPPLY OF STRATEGIC/CRITICAL MAT'L'S

(10) 1.1.1.4.1.6.1 RECOGNIZE NEED FOR ADEQUATE SUPPLIES

4, 3 10 - Recognized by High Military/Civilian Officials

2 7 - Recognized in Principle by High Officials

~~✓3~~ - Recognized by Non-Influential Functionaries

0 - Need is Unrecognized

(4) 1.1.1.4.1.6.2 MAINTAIN AN "IN-BEING" STOCK OF CRITICAL MAT'L'S

(7) 1.1.1.4.1.6.2.1 MAINTAIN APPROPRIATE STOCKPILE STRUCTURE

10 - Stockpile Maintained in "Upgraded" Form

4, 3 7 - Stockpile Maintained in Economically Convertible Form

~~✓3~~ - Stockpile Maintained in Raw Stock Only

0 - Stockpile Does Not Exist

(7) 1.1.1.4.1.6.2.2 MAINTAIN STOCKPILE AT SPECIFICATION LEVEL

4, 3 10 - Procedures Available to Rotate Stock to Ensure Meeting Specifications

2 5 - Procedures to Ensure Meeting Specifications are Happenstance

~~✓0~~ - No Procedures to Ensure Specification Compliance

(10) 1.1.1.4.1.6.2.3 MAINTAIN STOCKPILE AT PROJECTED REQUIREMENT LEVELS

10 - All Materials are at Projected Levels

4, 3 8 - 80% of Materials are at Projected Levels

2 5 - 50% of Materials are at Projected Levels

~~✓3~~ - Most Materials are Not at Projected Levels

0 - Necessary Levels are not Projected

(8) 1.1.1.4.1.6.3.0 MAINTAIN STOCKPILE REPLACEMENT CAPABILITY

(10) 1.1.1.4.1.6.3.1 MAINTAIN REPLACEMENT CAPABILITY FROM INTERNAL NATIONAL SOURCES

10 - All Materials Available from Developed, Operating Sources

4, 3 8 - All Materials Available from Developed Sources

✓5 - Necessary Sources are Known, but Significant Development Required

3 - Most Sources are Identified

0 - Necessary Sources are Not Identified

(2) 1.1.1.4.1.6.3.2 MAINTAIN REPLACEMENT CAPABILITY FROM EXTERNAL SOURCES

10 - Materials Not Available Internally are Available from Bloc Nations

✓8 - Materials Not Available Internally are Available from Sympathetic Nations over Secure Routes

5 - Materials Available only from Uncertain Nations over Non-secure Routes

3 - Materials Available only from Opposed Nations over Non-secure Routes

0 - Material Not Available

(10) 1.1.1.4.2.0 PROVIDE FORCE PROJECTION

(8) 1.1.1.4.2.1 DEPLOY FORCES AFLOAT - 7

(9) 1.1.1.4.2.2 DEMONSTRATE AIR/GROUND FORCES CAPABILITY - 8

(10) 1.1.1.4.2.3 DEMONSTRATE LOGISTICS SUPPORT (LINES OF COMMUNICATION) - 7

(10) 1.1.1.4.2.4 DEMONSTRATE VARIED MISSILE CAPABILITIES - 10

(8) 1.1.1.5.0 REDUCE U.S./ALLIES MILITARY CAPABILITY

(5) 1.1.1.5.1.0 REDUCE U.S. ACCESS TO CRITICAL MATERIALS

(10) 1.1.1.5.1.1.0 PREVENT PHYSICAL ACCESS

(10) 1.1.1.5.1.1.1 CONTROL THE LINES OF COMMUNICATION

10 - All Land/Sea/Air LOCs can be Brought under  
Absolute Control

4, 3 8 - Land/Sea/Air LOCs can be Significantly  
Affected

5 - Land/Sea/Air LOCs can be made Uncertain for  
any Specific Shipment

✓3 - Some Impact on Land/Sea/Air LOCs

0 - LOCs cannot be Affected

(4) 1.1.1.5.1.1.2 CONTROL THE SOURCES

10 - Critical Material Sources can be Brought  
Under Physical Control

4, 3 8 - Significant Numbers of Critical Material  
Sources can be Brought under Physical Control

2 5 - Specified Sources are Earmarked for Physical  
Control

✓3 - Potential for Control of Some Sources Exists

0 - Sources Cannot be Physically Controlled

(7) 1.1.1.5.1.2.0 PRECLUDE RAW MATERIAL ACQUISITION

(2) 1.1.1.5.1.2.1. EXERT FINANCIAL CONTROL

10 - Buy all Materials Sought by U.S.

4, 3 8 - Buy Sufficient Materials to Hamstring U.S.

5 - Buy Sufficient Materials to Hinder U.S.

2 3 - Buy Sufficient Materials to Inconvenience U.S.,  
but not Force Development of Alternative Sources

✓0 - No Capability for Financial Control

(10) 1.1.1.5.1.2.2. EXERT POLITICAL CONTROL

- 4, 3 10 - Source Governments will Sell only with Approval and in Specified Amounts
- 8 - Source Governments of Several Materials will Sell only with Approval
- 5 - Source Governments Consult before Sale
- 3 - Source Governments Decision can be Influenced
- 0 - Source Governments Totally Independent

(5) 1.1.1.5.2.0 HINDER DEVELOPMENT OF ALTERNATIVE SOURCES

(3) 1.1.1.5.2.1 TAKE OVERT ACTIONS

- 10 - Can Reasonably Expect to Influence Alternative Sources through Political Rhetoric or Financial Modes
- 4, 3 8 - Some Alternative Sources will Respond to Political/ Financial Modes
- 5 - Alternative Sources will Respond to Threat of Physical Action
- 3 - Physical Action Must be Taken
- 0 - No Response to Any Overt Actions

(10) 1.1.1.5.2.2 TAKE COVERT ACTIONS

- 10 - Can Maneuver Internal Government Structure to Thwart Sales
- 4, 3 8 - Can Maneuver Internal Agencies to Sabotage Resource
- 5 - Can Adversely Influence Distribution
- 3 - Can Adversely Influence Material Processing
- 0 - No Covert Influence Possible

- (9) 1.1.2.0 REDUCE THREAT FROM OTHER THAN U.S./NATO COUNTRIES
- (6) 1.1.2.1.0 CONFRONT/EXPLOIT NON-BLOC COMMUNIST STATES  
(e.g., Albania, China)
- (10) 1.1.2.1.1 FOMENT UNREST IN THESE COUNTRIES - 1
- (3) 1.1.2.1.2 SUPPORT TERRORISM IN THESE COUNTRIES - 1
- (5) 1.1.2.2.0 MONITOR/EXPLOIT THIRD WORLD COUNTRIES
- (10) 1.1.2.2.1 FOMENT UNREST IN THESE COUNTRIES - 10
- (3) 1.1.2.2.2 SUPPORT TERRORISM IN THESE COUNTRIES - 8
- (9) 1.2.0 MAINTAIN BUFFER STATE TERRITORIAL INTEGRITY
- (10) 1.2.1.0 MAINTAIN MILITARY AND INTERNAL ORDER
  - (9) 1.2.1.1 TAKEOVER KEY GOVERNMENT POSTS - 10
  - (10) 1.2.1.2 THREATEN MILITARY INVOLVEMENT - 10
  - (4) 1.2.1.3 THREATEN MILITARY INCURSIONS BY OTHER NATIONS - 3
- (7) 1.2.2.0 STRUCTURE ADEQUATE FORCE FOR "POLICING" SATELLITES
  - (10) 1.2.2.1 MAINTAIN SUFFICIENT "OCCUPATION" FORCES TO ENSURE STABLE DAY-TO-DAY OPERATIONS - 10
  - (8) 1.2.2.2 MAINTAIN SUPPORT STRUCTURE, BOTH INDIGENOUS AND HOMELAND - 6
  - (3) 1.2.2.3 MAINTAIN A SPECIFIED "SURGE" CAPABILITY - 10
- (8) 2.0 PROMULGATE THEIR "COMMUNIST" FORM OF GOVERNMENT
  - (6) 2.1.0 INCREASE THE NUMBER OF SATELLITE STATES
    - (3) 2.1.1 "RE-ACQUIRE" DEFECTED BUFFER STATES (i.e., Albania, Yugoslavia) - 0
    - (8) 2.1.2 ACQUIRE NEW BUFFER STATES (i.e., Greece, Iran) - 5
  - (10) 2.2.0 INCREASE THE NUMBER OF SUPPORTIVE STATES
    - (3) 2.2.1 GAIN STATES ALREADY FAVORABLE (i.e., Mozambique, Nicaragua) - 8
    - (8) 2.2.2 GAIN STATES NOW IN TURMOIL (i.e., Guatemala, El Salvadore) - 8

- (8) 2.3.0 INCREASE THE NUMBER OF DOMINATED NON-SATELLITE STATES (e.g., Finland)
  - (2) 2.3.1 COERCE WITH MILITARY PRESENCE (Border Buildup) - 2
  - (10) 2.3.2 CONTROL THROUGH POLITICAL INFLUENCE OF THIRD PARTY - 5
  - (6) 2.3.3 COERCE THROUGH THREAT OF ECONOMIC SANCTIONS - 5
- (5) 2.4.0 INCREASE THE NUMBER OF SYMPATHETIC STATES
  - (10) 2.4.1 PROVIDE READILY AVAILABLE GRANTS AND LOANS - 7
  - (4) 2.4.2 PROVIDE MILITARY ARMS FOR STATE'S USE - 7
  - (8) 2.4.3 SPEAK ON BEHALF OF STATES IN INTERNATIONAL FORUMS - 8
- (10) 3.0 PROTECT AGAINST INTERNAL UNREST
  - (10) 3.1.0 CONTROL THROUGH PHYSICAL MEANS
    - (10) 3.1.1.0 PERPETUATE CENTRALIZATION OF DECISION MAKING
      - (10) 3.1.1.1 MAINTAIN POLITICAL CONTROL OF MILITARY/PARTY - 10
      - (8) 3.1.1.2 CONTROL AND/OR ELIMINATE NEGATIVE COALITIONS/INTEREST GROUPS - 8
      - (10) 3.1.1.2.1 ATOMIZE POTENTIAL INTEREST GROUPS - 9
      - (5) 3.1.1.2.2 LIMIT NONOFFICIAL CONTACTS AND COMMUNICATION - 8
    - (8) 3.1.2 ELIMINATE NONOFFICIAL INFORMATION SOURCES
      - (10) 3.1.2.1 CONTROL RADIO/TV/NEWSPAPERS (INTERNAL/EXTERNAL) - 10
      - (8) 3.1.2.2 CONTROL FOREIGN TRAVEL BY SOVIET CITIZENS - 9
      - (8) 3.1.2.3 CONTROL TOURIST TRAVEL WITHIN USSR - 8
    - (3) 3.1.3 SEPARATE AND DISPOSE OF DISSIDENTS - 5
    - (2) 3.1.4 CONTROL ACCESS TO DEADLY ARMS - 10
  - (10) 3.2.0 CONTROL THROUGH PSYCHOLOGICAL MEANS
    - (5) 3.2.1 ENCOURAGE THE IDEOLOGY
      - (10) 3.2.1.1 INDUCE DEDICATION OF THE POPULATION - 10
      - (8) 3.2.1.2 ELIMINATE FACTIONATION/EMPHASIZE ALLEGIANCE - 8
      - (9) 3.2.1.3 ELIMINATE NATIONAL APATHY - 5
      - (5) 3.2.1.4 INDUCE SENSE OF INTERNATIONAL CHALLENGE TO WELL-BEING - 10

- (5) 3.2.2 ACHIEVE "PURENESS OF SOVIET LIFE"
  - (6) 3.2.2.1 REDUCE ALCOHOLISM AS A NATIONAL PROBLEM - 1
  - (3) 3.2.2.2 PREVENT THEFT OF STATE PROPERTY (MORALLY UPLIFTING) - 5
  - (1) 3.2.2.3 ELIMINATE DRUG ABUSE - 5
  - (10) 3.2.2.4 FOSTER THE BELIEF THAT LIFE IS PERFECT IN THE COMMUNIST-RUN REGIME - 5
- (8) 3.3 PROVIDE FOR PEOPLE'S REQUIREMENTS
  - (10) 3.3.1 PROVIDE ADEQUATE FOOD AND SHELTER
    - (10) 3.3.1.1 MANAGE PRODUCTION CAPABILITY/RAW MATERIALS - 4
    - (5) 3.3.1.2 PROVIDE APPROPRIATE AND TIMELY DISTRIBUTION NETS - 3
  - (5) 3.3.2 PROVIDE FOR MEDICAL CARE AND PERSONAL SAFETY
    - (8) 3.3.2.1 ENSURE ADEQUATE HEALTH CARE AND MEDICINE - 6
    - (3) 3.3.2.2 ENSURE RECREATION FOR PHYSICAL FITNESS - 8
    - (10) 3.3.2.3 PREVENT STREET CRIME/PROTECT AGAINST NATURAL DISASTER - 8
  - (2) 3.3.3 PROVIDE DURABLE GOODS AND SERVICES
    - (5) 3.3.3.1 ESTABLISH/MAINTAIN DURABLE GOODS PRODUCTION BASE - 5
    - (2) 3.3.3.2 ENSURE DURABLE GOODS DISTRIBUTION NET - 2
    - (3) 3.3.3.3 ENSURE BASIC SERVICES INFRASTRUCTURE - 2
  - (5) 3.3.4 PROVIDE ADEQUATE EDUCATION
    - (10) 3.3.4.1 ENSURE LITERACY IN RUSSIAN FOR ALL CITIZENS - 6
    - (5) 3.3.4.2 IMPROVE SKILL LEVELS - 6
    - (10) 3.3.4.3 PROVIDE OPPORTUNITY FOR HIGHER EDUCATION TO THOSE QUALIFIED - 9
    - (3) 3.3.4.4 FOSTER NON-FACTIONATING CULTURE RETENTION - 6
    - (10) 3.3.4.5 EMPHASIZE SCIENTIFIC/TECHNICAL EDUCATION - 10

- (9) 4.0 MAINTAIN THE ECONOMIC STRUCTURE
- (10) 4.1 MAINTAIN HIGH LEVEL OF HEAVY INDUSTRY INVESTMENT - 10
- (6) 4.2 ENSURE PRODUCTIVITY
  - (5) 4.2.1 PROVIDE EMPLOYMENT - 10
  - (10) 4.2.2 IMPROVE STANDARD OF LIVING - 8
  - (6) 4.2.3 IMPROVE MANAGEMENT TECHNIQUES - 5
- (6) 4.3 LESSEN DEPENDENCY ON WESTERN GOODS/TECHNOLOGY - 5
- (7) 4.4 MAINTAIN FAVORABLE BALANCE OF PAYMENTS
  - (5) 4.4.1 MAINTAIN INTERNATIONAL CURRENCY STABILITY - 7
  - (10) 4.4.2 INCREASE AVAILABILITY OF "HARD CURRENCY" ITEMS - 5
- (7) 4.5 INCREASE ECONOMIC INFLUENCE
  - (4) 4.5.1 PROVIDE AID TO SELECTED COUNTRIES
    - (10) 4.5.1.1 PROVIDE MILITARY ASSISTANCE (Arms and Advisors) - 7
    - (5) 4.5.1.2 PROVIDE ECONOMIC AID (Loans and Grants) - 6
    - (5) 4.5.1.3 PROVIDE TECHNICAL ASSISTANCE - 8
  - (10) 4.5.2 INCREASE ECONOMIC DEPENDENCY OF OTHER STATES
    - (10) 4.5.2.1 DEPENDENCY ON SOVIET PRODUCTS (e.g., Europe Pipeline) - 8
    - (5) 4.5.2.2 DEPENDENCY ON SOVIET PURCHASES (e.g., U.S. Grain Farmers) - 8

of national purpose is 70.84. Values for the U.S. and U.S.S.R. state vectors are then mapped into a discrete scalar, Figure E-2.

The next step is to identify the allocable resources at this moment in the game and define the combination for the moves and countermoves. The scenario which grows out of this move then enables the determination of the worth as expressed in achievement of national purpose. In Scenario 2, the U.S.S.R. has determined that they should move to assure a war mobilization capability. As such, they will take certain steps as depicted by the number 2 in the Soviet Purpose valued state space. The U.S. takes no positive response (no countermove) and suffers a resultant decrease in achievement of national purpose (see Figure E-3). The values are 70.92 and 75.53 for the U.S.S.R. and U.S. respectively. Again, the values are mapped and it can be observed that the trend is unfavorable to the U.S. as regards the joint payoff.

In Scenario 3, the U.S.S.R. has determined a need to take strong action to build a stockpile in support of national needs. Consequently, their approach becomes more adventuresome and they propose actions which may in fact provoke a crisis. Their resources are marshalled to this effect and the resultant posture is shown by the number 3 in the Soviet Purpose. As in Scenario 2, the U.S. makes

DISCRETE SCALAR

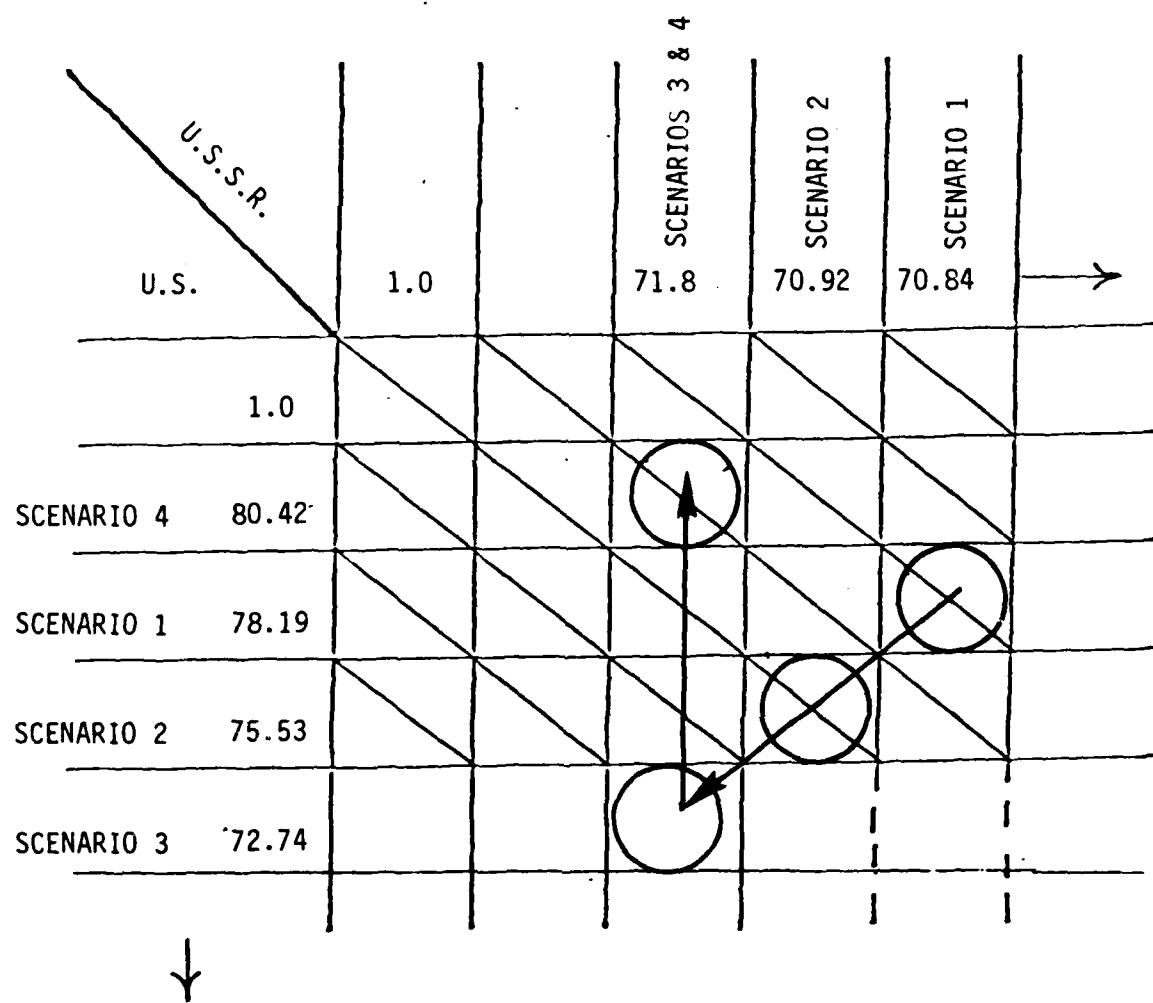
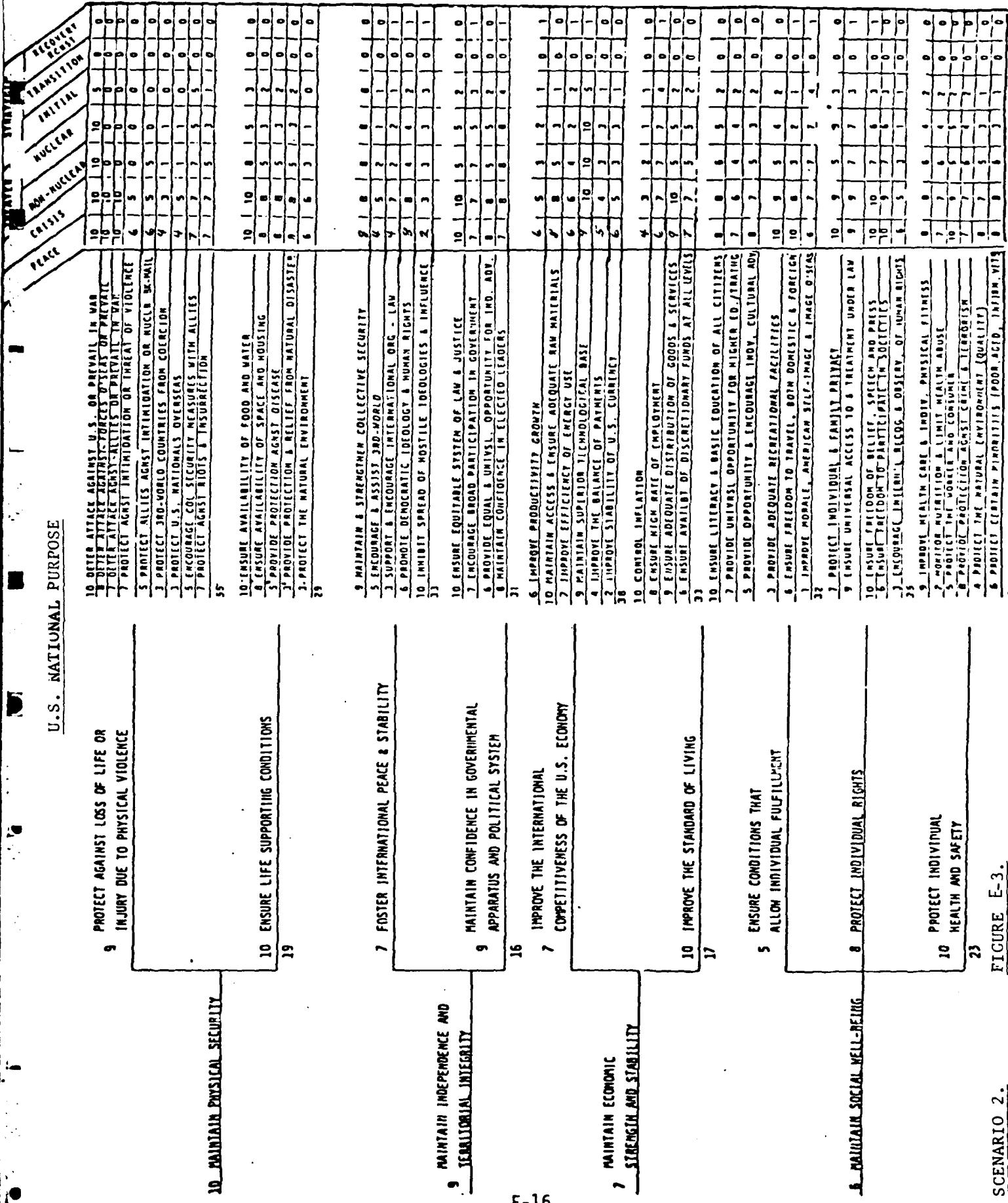


FIGURE E-2.



## SCENARIO 2.

no countermove and suffers a greater decrease in achievement of national purpose as shown in Figures E-2 and E-4. The values for achievement of national purpose are 71.8 and 72.74 for the U.S.S.R. and U.S., respectively.

In Scenario 4, the U.S.S.R. continues the same policy and commitment of resources as in Scenario 3, as shown by the number 4 in the Soviet state space. However, in this case, the U.S. has determined it to be in the national interest to respond and has made the necessary commitment of resources to counter the Soviet action. Because of these countermoves, the U.S. finds itself in a more advantageous posture reflected in the level of achievement of purpose shown in Figures E-2 and E-5. Values for achievement of national purpose are 71.8 for the U.S.S.R. and a much improved 80.42 for the U.S. It should be noted, however, that although the overall achievement of U.S. national purpose is improved, the U.S.S.R. actions have in fact still maintained the U.S. access to adequate raw materials in some degree of jeopardy. Here, then, is the value of the joint state space. Subsequent moves (scenarios) would vary the commitment of allocable resources to find the optimum approach.

The next step to be developed is the assessment of a joint payoff function and the incorporation of this value in the calculations of the strategies pertinent to strategic and critical materials. This coupling effort has been deferred for addressal in the follow-on study.

U.S. NATIONAL PURPOSE

9 PROTECT AGAINST LOSS OF LIFE OR INJURY DUE TO PHYSICAL VIOLENCE

10 ENSURE LIFE SUPPORTING CONDITIONS

19

10. MAINTAIN PHYSICAL SECURITY

RECOVERY  
TRANSITION  
INITIAL  
NUCLEAR  
NON-NUCLEAR  
CRISIS  
PEACE

10. DEFEND AGAINST U.S. ON PREVAIL IN WAR	10
7. DEFEND AGAINST FORCES OF TSATS ON PREVAIL IN WAR	10
7. PROTECT AGAINST THREAT AGAINST ALLIES FOR TSATS ON PREVAIL IN WAR	10
5. PROTECT AGAINST THREAT AGAINST OR THREAT OF VIOLENCE	0
5. PROTECT ALLIES AGAINST INTIMIDATION OR NUCLEAR WAR	0
3. PROTECT 3RD-WORLD COUNTRIES FROM COLONIZATION	0
3. PROJECT U.S. NATIONALS OVERSEAS	0
3. ENFORCE CO-SECURITY MEASURES WITH ALLIES	0
7. PROJECT AGAINST RIOTS & INSURGENCY	0
55	0

10. ENSURE AVAILABILITY OF FOOD AND WATER	10
6. ENSURE AVAILABILITY OF SPACE AND HOUSING	0
5. PROVIDE PROTECTION AGAINST DISEASE	0
3. PROVIDE PROTECTION & RELIEF FROM NATURAL DISASTER	0
3. PROJECT THE NATURAL ENVIRONMENT	0
29	0

7 FOSTER INTERNATIONAL PEACE & STABILITY

19

9. MAINTAIN CONFIDENCE IN GOVERNMENTAL APPARATUS AND POLITICAL SYSTEM

9. MAINTAIN & STRENGTHEN COLLECTIVE SECURITY	7
5. ENCOURAGE & ASSIST 3RD-WORLD	6
3. SUPPORT & ENCOURAGE INTERNATIONAL ORG - LAN	6
6. PROMOTE DEMOCRATIC IDEOLOGY & HUMAN RIGHTS	8
10. INHIBIT SPREAD OF HOSTILE IDEOLOGIES & INFLUENCE	0
33	0

10 IMPROVE THE INTERNATIONAL COMPETITIVENESS OF THE U.S. ECONOMY

16

7. MAINTAIN ECONOMIC STRENGTH AND STABILITY

10. MAINTAIN ACCESS & SECURE ADQUATE RAW MATERIALS	5
7. IMPROVE EFFICIENCY OF ENERGY USE	0
9. MAINTAIN SUPERIOR TECHNOLOGICAL BASE	6
4. IMPROVE THE BALANCE OF PAYMENTS	0
2. IMPROVE STABILITY OF U.S. CURRENCY	0
38	0

10 IMPROVE THE STANDARD OF LIVING

17

5. ENSURE CONDITIONS THAT ALLOW INDIVIDUAL FULFILLMENT

10. ENSURE LITERACY & BASIC EDUCATION OF ALL CITIZENS	0
7. PROVIDE UNIVERSAL OPPORTUNITY FOR HIGHER ED / TRAINING	0
5. PROVIDE OPPORTUNITY & ENCOURAGE INDY. CULTURAL ADV	0
6. ENSURE AVAILABILITY OF DISCRETIONARY FUNDS AT ALL LEVELS	0
33	0

6. MAINTAIN SOCIAL WELL-BEING

8. PROJECT INDIVIDUAL RIGHTS

10. HEALTH AND SAFETY

10. ENSURE FREEDOM TO TRAVEL, BOTH DOMESTIC & FOREIGN	0
7. PROJECT INDIVIDUAL & FAMILY PRIVACY	0
9. ENSURE UNIVERSAL ACCESS TO & TREATMENT UNDER LAW	0
6. RESPECT FAIRNESS & RIGHT OF PARTICIPATION IN SOCIETY	0
35	0
9. IMPROVE HEALTH CARE & MOBILITY, PHYSICAL FITNESS	0
2. MONITOR NUTRITION & LIMIT MENTAL ABUSE	0
5. PROTECT THE SOUL & COMMUNION	0
8. PROVIDE PROTECTION AGAINST CRIME & TERRORISM	0
4. PROTECT THE NATURAL ENVIRONMENT (QUALITY)	0
6. PROTECT CERTAIN PRIVACIES (FOOD, AGTO, INFIRM, M19)	0

SCENARIO 3.

FIGURE E-4.

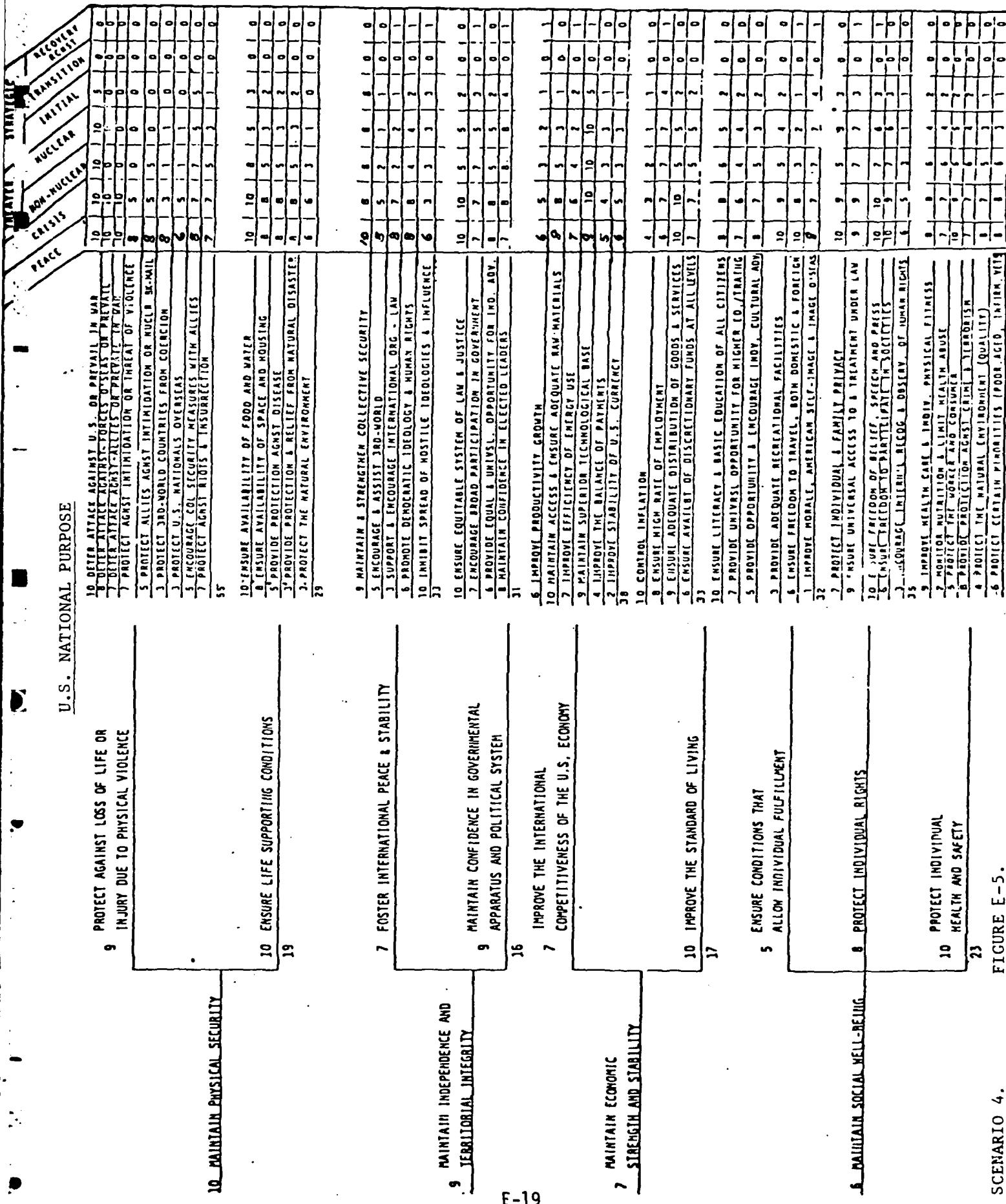


FIGURE E-5.

SCENARIO 4

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**END**

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